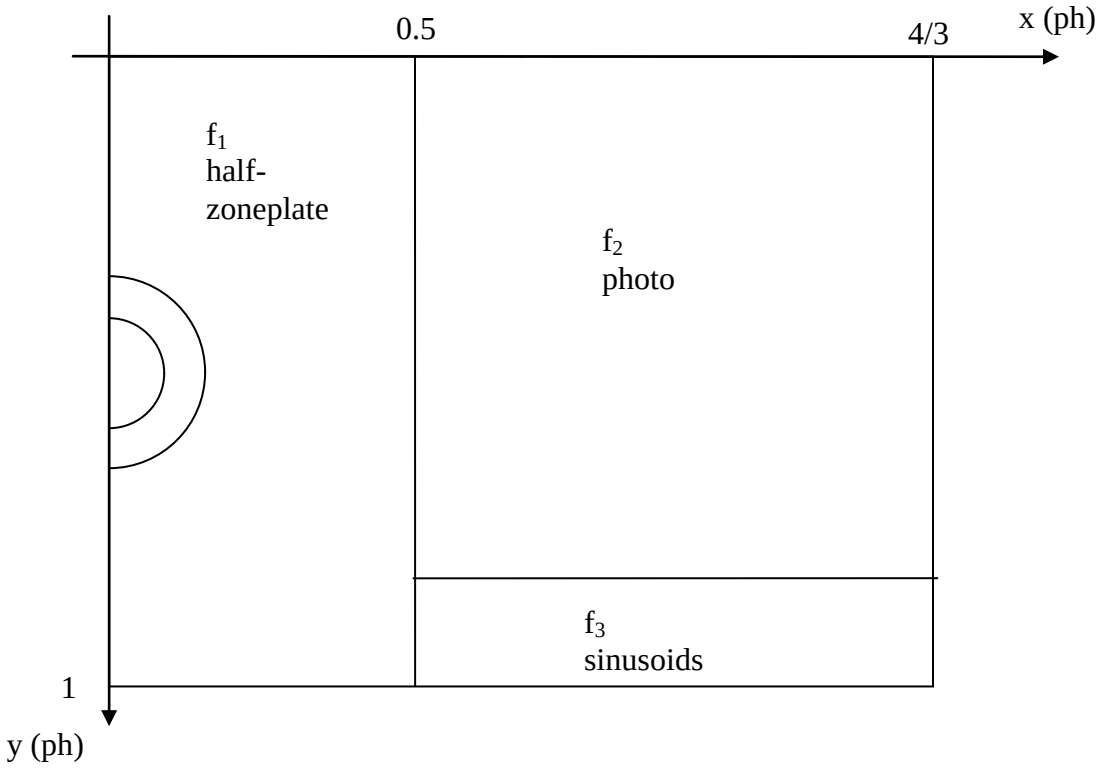
CEG4316 Digital Image Processing
Sept. 19, 2013
Create an image test pattern

1. Create and display a 4:3 image (4/3 ph by 1 ph) consisting of 1024 by 768 samples as follows.



You should create three images A, B, C and mosaic them as Z= [A [B; C]]. Use same procedure as last week with `meshgrid` to generate A and C, of course making the appropriate adjustments to size, spacing, etc. Note that u_1, v_1, u_2, v_2 have units of c/ph and r is in ph.

$$f_1(x,y) = (0.5 + 0.5\cos(\pi(x^2 + (y-.5)^2)/r^2)), \quad r = 0.05, \quad 0 \le x < 0.5, \quad 0 \ge y < 1$$

$$f_2(x,y) = \text{photo}(x,y) \ \text{(640 by 640 image)}$$

$$f_3(x,y) = (0.5 + 0.25\cos(2\pi(56x + 9y)) + 0.25\cos(2\pi(30x - 180y))), \quad 0 \le x > 0.8\overline{3}, \quad 0 \le y < 0.1\overline{6}$$

$$f = f_1 + \mathcal{T}_{(.5,0)} f_2 + \mathcal{T}_{(.5,0.8\overline{3}).} f_3$$

where $\mathcal{T}$ is the shift operator. Save the test image as a TIFF file, and make sure you can display the saved image. Experiment with other values of r, u_1, v_1, u_2, v_2. (Make them variables in your m-file.)

2. Compute the following point-wise non-linear transformation of the image **Z** in two ways. Time each using tic, toc and compare. Also display both Z1 and Z2 and compare.

(a) Z1 = direct computation (you figure out how)

(b)
```
for i = 1:768
    for j = 1:1024
        if(Z(i,j) < 0.0031308)
            Z2(i,j) = 22.92*Z(i,j);
        else
            Z2(i,j) =1.0555*Z(i,j)^0.41666 - 0.055;
        end
    end
end
```